



Unit 3

Aqueous Brake Washing

Baseline: Solvent Brake Washing

Option 1: Aerosol cans of brake cleaner

Option 2: Roll-up solvent washers

Environmental Concerns

- **Solvent emissions cause smog formation**
- **Spent solvents are hazardous waste**
- **Aerosol product use increases worker exposure**
- **Empty aerosol cans - bulky, nonbiodegradeable waste**
- **Solvent-contaminated rags**

P2 Alternative: Aqueous Brake Cleaning

- Avoid final shot of aerosol brake cleaner
- Use compressed air for drying
- Consider units that adjust in height



Waste Management

- **Shop manager is responsible for determining whether waste is hazardous**
- **Some vendors will dispose of solution for you**
- **Avoid contaminating with aerosol products**
- **Informal Bay Area Survey: solution change every 3 years**

Typical Scenario

- > 20 brake jobs / month
- Payback < 2 years
- Assumptions
 - Aerosol brake cleaner \$2 / can
1 can / job
 - Aqueous unit \$800
 - Aqueous cleaner \$25
 - Disposal: solution and filters \$30/ yr.

Case Studies

- **1997 - Southern California**
- **Shop size: small to large (3-35 employees)**
- **Number of brake jobs per week: 3-25**
- **Baseline annual cost of aerosol & mineral spirit cleaning: \$117 - \$1957**

Case Studies

- **Types of cleaning units tested:**
 - heated or cold
 - wheeled
 - batch and single job
- **Variety of cleaners used:**
 - enzyme
 - detergent based

Case Studies

Annual Cost Savings

- **About 20% to 80% annual cost savings for all test shops**
 - **compared to aerosol brake cleaners**
- **Highest volume shop: about 80% annual cost savings**
- **Full report and 1 page case studies:**
<http://home.earthlink.net/~irta/rprt0005.html>

Chlorinated Product Ban

- **Automotive maintenance and repair facilities**
- **State regulation bans the sale and use of:**
 - **Perchloroethylene (Perc)**
 - **Methylene chloride (MeCl)**
 - **Trichloroethylene (TCE)**
- **Aerosols and bulk liquid product ≤ 2 gal.**
- **Effective dates, beginning:**
 - **Sale: July 1, 2002**
 - Final sell through date
 - **Use: January 1, 2003**

Chlorinated Product Ban

- **Regulations and More Information - ARB**
 - **Rulemaking Update**
<http://www.arb.ca.gov/regact/regup00.htm#amr>
 - **Fact Sheet, Workshop Summary**
<http://www.arb.ca.gov/toxics/amr.htm>
 - **Final Rulemaking**
 - **Approved and Filed April 4, 2001**
 - <http://www.arb.ca.gov/regact/amr/amr.htm>

Caution!!

Alternatives to Chlor. Solvents

- **Phase out of chlorinated solvents may result in the increased use of other products - can cause adverse health effects**
- **Many automotive products contain Hexane**
 - **brake cleaners, degreasers**
 - **aerosol and bulk**
- **Debilitating illness can result from exposure to Hexane - Peripheral Neuropathy**

Hexane - Caution

- **mixture of isomers**
 - 20-80% n-hexane (normal hexane)
- **n- hexane - well documented neurotoxin**
- **Inhalation - main route of exposure**
 - dermal contact exposure
- **Exposure Symptoms:**
 - numbness in extremities
 - decreased grip strength - dropping tools

Hexane Worker Exposures

- **California DHS - OHB, Health Evaluation Systems and Information Services (HESIS)**
 - **Case Studies - chronic exposures**
 - **Working with Machinists Union**
 - **Publications - n-hexane health advisory**
<http://www.dhs.ca.gov/ohb/HESIS/nhexane.pdf>
- **Aqueous cleaning system = alternative**

Take Home Messages

- **Performance \geq other methods**
- **Lower / no worker exposures**
 - **Pay attention to substitutions**
- **Do not cross-contaminate**
- **Can save \$\$ compared to aerosols**